

## **SECTION 1.0 PURPOSE AND NEED**

### **1.1 Introduction**

At no time in its history has the northwest corner of North Dakota faced greater challenges and opportunities than it does at the start of the 21<sup>st</sup> century. Its economic foundation was built upon its natural resources: land, water, and minerals. This economic foundation is being transformed by dramatic changes in agriculture, changes in shipping practices, emergence of the information economy, relocation of people from rural to urban areas, growth of tourism, and growth in area processing plants. Changes in the area's agriculture and other natural resource industries are causing the greatest concerns. However, some of the changes, especially in agriculture, also offer new opportunities for the area.

Transportation infrastructure plays a significant role in supporting the logistical needs of the existing economy. The challenge is to anticipate the changes in the non-transportation sector in order to provide a transportation system capable of meeting the needs. Transportation improvements can take years or even decades from initial planning to completion. Business developers make decisions quickly, and it is important to them that services are in place before they make a location decision. Therefore, it is important that the transportation infrastructure provides a safe, reliable, efficient system that keeps pace with current and future needs.

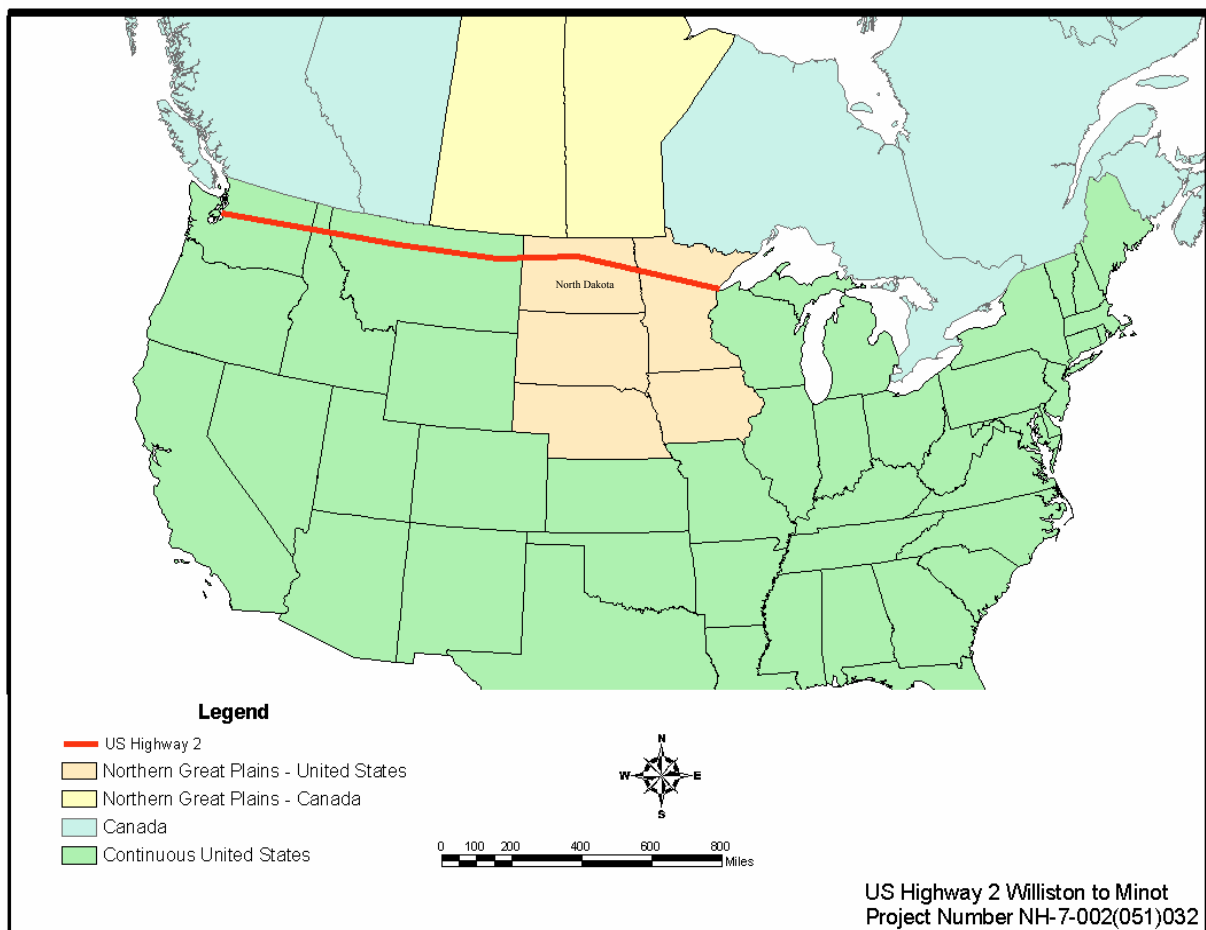
The purpose of the proposed US 2 reconstruction project is to improve safety, enhance system performance, and improve system continuity. The proposed project is needed to address safety problems resulting from roadway deficiencies, frequent turning movements, a higher percentage of truck traffic, and an aging driver population. Significant additional safety concerns stem from the conflict between traffic traveling at high speeds and traffic traveling at much slower speeds, such as military convoys and large, slow-moving agricultural machinery. The proposed project is needed to support the increasing transportation needs resulting from changes in the economy and ongoing

economic development initiatives. Population and business losses in smaller towns have forced many residents to travel longer distances to obtain basic services and employment opportunities. The project area is also experiencing consolidation of grain elevator, diversification of crops, and increased use of irrigation, which are all factors associated with increased use of trucks to transport agricultural products to market. Additionally, improvements to US 2 are necessary to allow the roadway to function properly as part of the Interregional System of roads under NDDOT's Highway Performance Classification System.

## 1.2 Study Area Description

North Dakota, located in the Northern Great Plains (NGP) region, is in the geographic center of North America (See Figure 1-1).

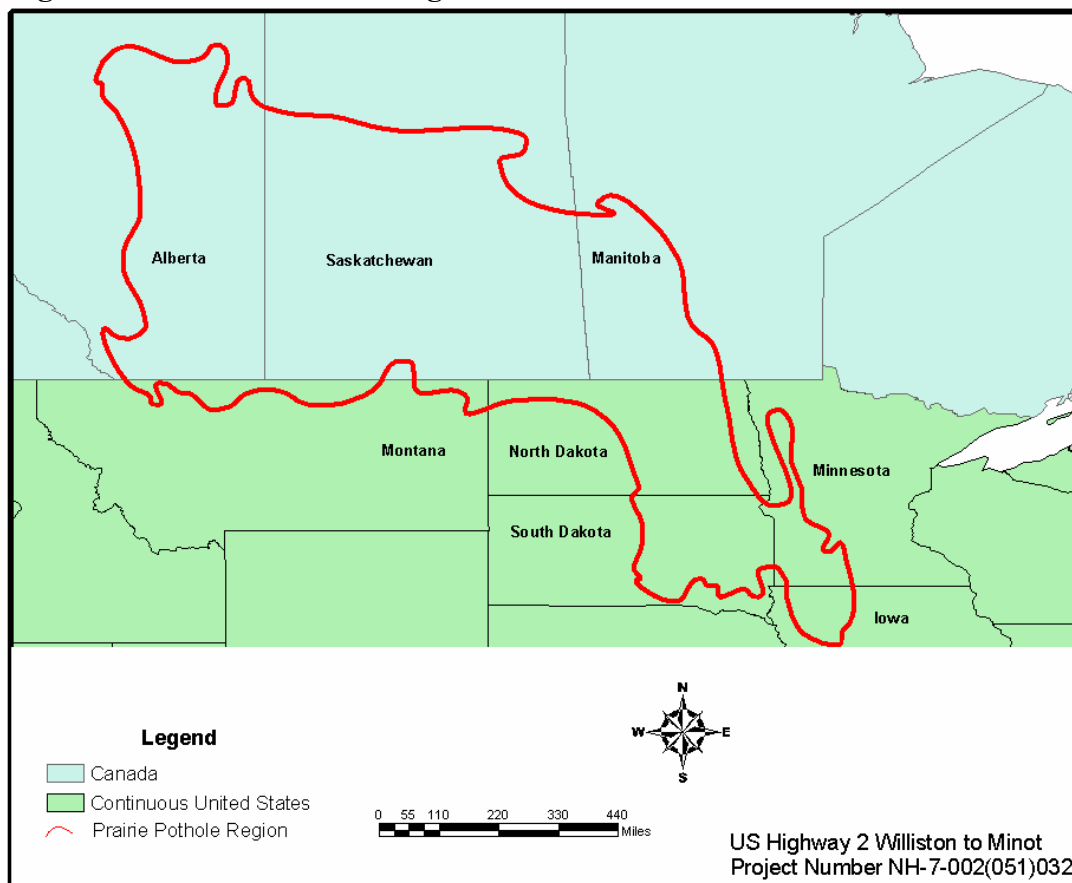
**Figure 1-1. North America and the Northern Great Plains**



The region has abundant natural resources within and near its borders and accesses continental and global markets through its extensive transportation infrastructure. Natural infrastructures (i.e., regional rivers and the Great Lakes) have long benefited transportation in certain portions of the NGP. On the other hand, North Dakota is entirely dependent on the man-made infrastructure of railroads and highways for providing a transportation system that safely moves people and goods. Predominant land uses and historical economy of the NGP region is agricultural. In North Dakota, nearly 90 percent of the land area is in farms and ranches.

Furthermore, a portion of north-central United States and south-central Canada is located in an area known as the "prairie pothole region" (See Figure 1-2).

**Figure 1-2. Prairie Pothole Region**

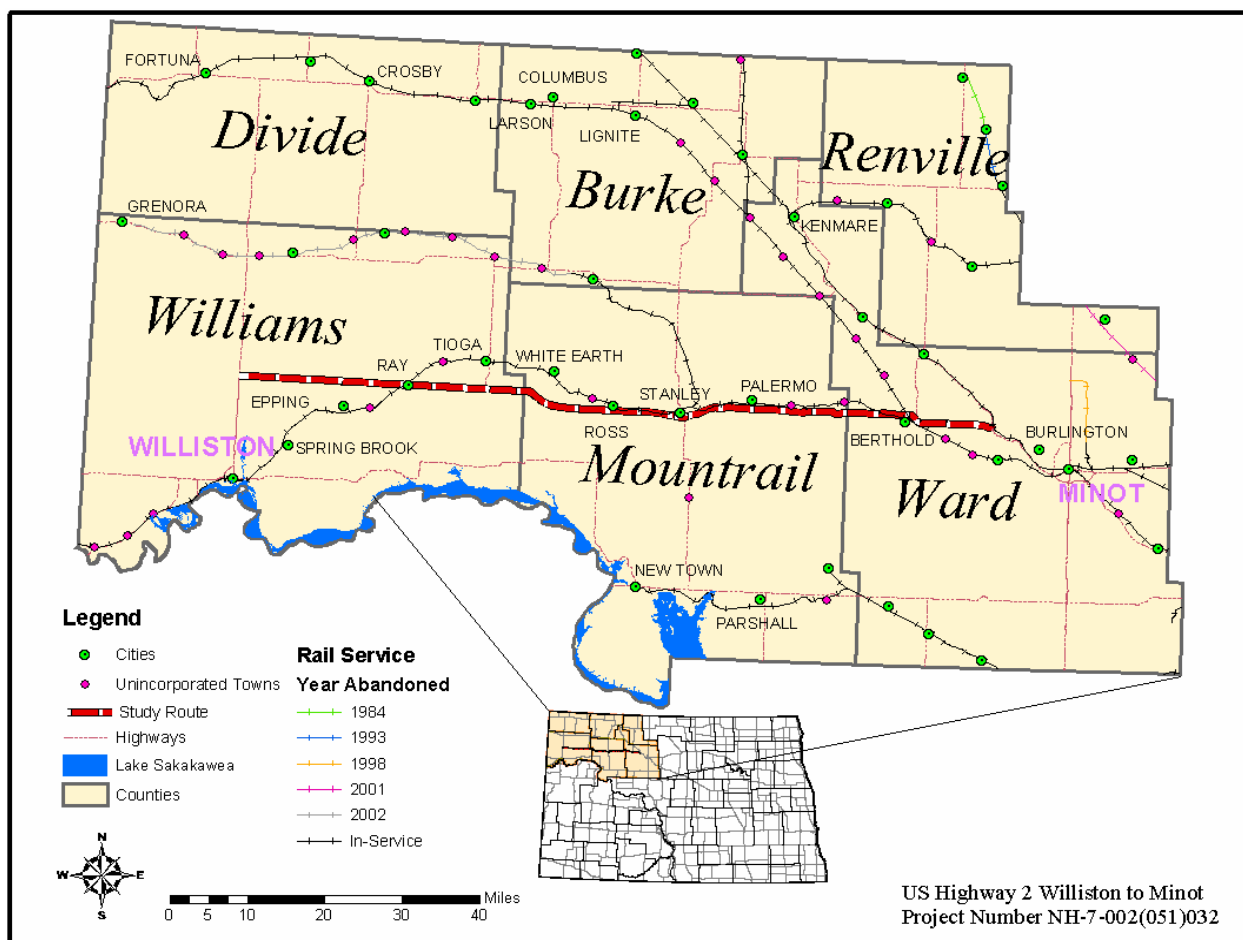


When the last glacier retreated from the NGP, it left scars, depressions, and accumulations of debris, creating the prairie pothole region. The prairie pothole region is

characterized by rolling hills and millions of isolated small depressions, ponds, and lakes. These depressions are also known as sloughs, potholes, and wetlands. Prairie potholes are constantly changing from year to year. Approximately two-thirds of North Dakota is located in the prairie pothole region, which includes the study area for this proposed project. Included in the study area are the six northwest North Dakota counties of Divide, Burke, Renville, Williams, Mountrail, and Ward (See Figure 1-3).

The eastern two-thirds of the project area includes rolling terrain, many isolated potholes (most are surrounded by cultivated land), and occasional small lakes. The western third of the project area can be characterized as more hilly with well-defined drainage patterns and numerous valleys and coulees. Predominant land use in the pothole region of North Dakota is agricultural. The majority of this agricultural land is cultivated with the remainder used for grazing cattle or forage production.

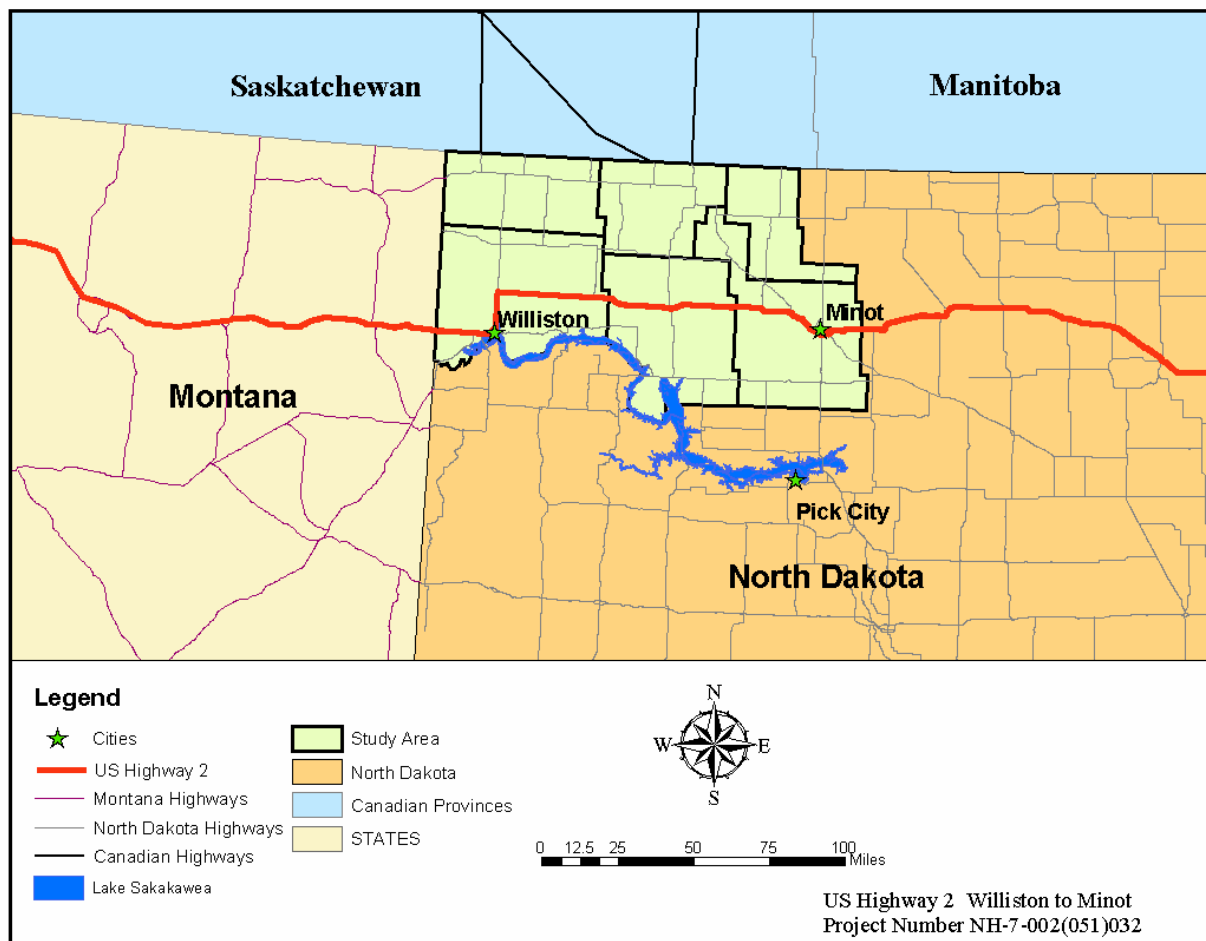
**Figure 1-3. Study Area (Counties and Cities)**



The six-county study area is bordered by Canada to the north, Montana to the west, and Lake Sakakawea to the south. Lake Sakakawea stretches, from near the Montana border, east approximately 180 miles to the Garrison Dam at Pick City, N.D (See Figure 1-4).

Lake Sakakawea was created in 1953 when the Garrison Dam was completed. This lake has no railroad crossings and only one vehicle bridge crossing on this entire length. The lake averages between two and three miles in width and is six miles wide at its widest point. When the lake was formed, approximately 368,000 acres were flooded and all river crossings but one were lost. Flooded land included cultivated farmland along the bottoms and pastures or forage land on the sloped terrain. The lake created a potential for extensive irrigation, that has recently begun to develop, and it provides extensive recreation opportunities.

**Figure 1-4. Study Region**



There are 46 incorporated towns located in the study area. Additionally, there are many farms and 27 unincorporated towns scattered across this six-county area (See Figure 1-3). Only two of the towns, Minot and Williston, have a population more than two thousand, and 34 of the 46 towns have a population less than five hundred, according to the 2000 U.S. Census Bureau.

### **1.2.1 Study Area Population**

According to the U.S. Census Bureau, in the last decade, North Dakota has experienced the smallest population increase (0.53 percent) of all the states in the NGP. From 1960 (start of Interstate construction across southern and eastern N.D.) through 2000, population in North Dakota has seen a modest 1.54 percent increase (See Table 1-1).

**Table 1-1. State and County Population**

<b>Year</b>	<b>Burke</b>	<b>Divide</b>	<b>Mountrail</b>	<b>Renville</b>	<b>Ward</b>	<b>Williams</b>	<b>North Dakota</b>
1960	5,886	5,566	10,007	4,698	47,072	22,051	632,446
1970	4,739	4,564	8,437	3,828	58,560	19,301	617,761
1980	3,822	3,494	7,679	3,608	58,393	22,237	652,717
1990	3,002	2,899	7,024	3,160	57,921	21,129	638,800
2000	2,242	2,283	6,631	2,610	58,795	19,761	642,200

Source: US Department of Commerce, Bureau of the Census, Decennial Censuses

The increase, however, has not been uniform. Five of the counties in the study area experienced a population drop (Williams -10.4 %, Mountrail -33.7 %, Renville -44.4 %, Divide -59.0 %, Burke -61.9 %). Ward County is the only county in the study area that has experienced a population increase (24.9 %) since 1960. Minot, the county seat and largest city of Ward County, and its bedroom communities have accounted for the population increases. Outlying Ward County communities have all experienced a decline in residents (See Table 1-2).

Currently, the NGP is in a pattern of rural population migration to cities and larger towns. This pattern holds true for North Dakota where non-metropolitan residents dropped from 63 percent to 57 percent of the population from 1990 to

2000. Similarly, there were 369 or 12 percent fewer farms in 1997, compared to ten years earlier (United States Department of Agriculture website) in the six-county study area. This population migration has resulted from declining economic opportunities in the rural area. This population shift has also resulted in an increase in the median age of the residents (See Table 1-3).

**Table 1-2. City Population In Ward County**

City	1940	1950	1960	1970	1980	1990	2000
Berthold <sup>1</sup>	428	459	431	398	485	409	466
Burlington <sup>1</sup>	-	-	262	247	762	995	1,096
Carpio	322	194	199	215	244	178	148
Donnybrook	215	207	196	163	139	106	90
Douglas	313	236	210	144	112	93	64
Kenmare	1,528	1,712	1,696	1,515	1,456	1,214	1,081
Makoti	212	219	214	159	199	145	145
Minot	16,577	22,032	30,604	32,290	32,843	34,544	36,567
Ryder	467	330	264	211	158	121	92

1. Bedroom communities of Minot.

Source: US Department of Commerce, Bureau of the Census, Decennial Censuses

According to North Dakota State Data Center, if the current trend continues, the number of elderly (age 65 or older) in the state will grow by 58 percent over the next 20 years and will represent nearly 23 percent of the state's population. The more rural the area, such as the study area in northwest North Dakota, the more drastic the population shift has been and the increase in median age has been greater. In these rural areas, the elderly continue to do their own driving due to lack of alternate modes of transportation.

Older drivers' decreased contrast sensitivity, reduced useful field of view, increased decision time, and slower vehicle-control-movement-execution combine to put these highway users at greater crash risk<sup>1</sup>. Crash analyses and observational studies by Benekohal, Resende, Shim, Michaels, and Weeks (1992) showed that older drivers had more difficulty following pavement markings, finding the beginning of turn lanes, and driving across intersections.

<sup>1</sup> FHWA-RD-01-103 Highway Design Handbook For Older Drivers and Pedestrians, U.S. Department of Transportation, 2001.

Responses from a focus group of older drivers (study by Staplin, Harkey, Lococo, and Tarawneh, 1997) listed the following as problems older drivers experience:

- Difficulty in turning their heads at skewed angles to view intersecting traffic.
- Difficulty in smoothly performing turning movements at tight corners.
- Hitting raised concrete barriers such as channelizing islands in the rain and at night.
- Finding oneself positioned in the wrong lane, especially a turn-only lane during an intersection approach, due to poor visibility of pavement markings or the obstruction of roadside signs designed to inform drivers of intersection traffic patterns.
- Difficulty at the end of an auxiliary turn lane in seeing potential conflicts well and quickly enough to smoothly merge with adjacent-lane traffic.
- Merging with adjacent-lane traffic at a pavement width reduction, when the lane drop occurs near an intersection.

**Table 1-3. Median Age**

<b>County</b>	<b>1960</b>	<b>1970</b>	<b>1980</b>	<b>1990</b>	<b>2000</b>
Burke	30	34	39	43	47
Divide	29	33	40	43	49
Mountrail	26	30	32	36	40
Renville	28	31	33	37	44
Ward	24	23	26	29	32
Williams	25	27	27	34	40

Source: US Department of Commerce, Bureau of the Census, Decennial Censuses

Currently, four of the six counties of the study area have less than six persons per square mile and are labeled “frontier counties.” People per square mile in the six-county study area are Ward 29.2, Williams 9.5, Mountrail 3.6, Renville 3.0, Burke 2.0, and Divide 1.8 (USDA website). Concerns about the future of the NGP region prompted Congress to initiate legislation that would assist the NGP to move forward with a strong economic foundation for its rural communities.



In 1994, the U.S. Congress passed the Northern Great Plains Rural Development Act as Public Law 103-318. The Act established the Northern Great Plains Rural Development Commission to recommend rural development strategies for the NGP. The Commission recommended that the NGP region should develop a long-term trade and transportation infrastructure strategy for ensuring that its export products are able to get to market. Listed below are several of their recommendations that were directed towards the highway transportation sector:

- Investment in a core system of upgraded local rural roads that serve markets important to agricultural and manufacturing firms.
- Disinvestments should be made in low-volume gravel roads that cannot be economically upgraded to adapt to the dynamic changes occurring in the rural transportation freight industries.
- All transportation investments in the five-state area should be evaluated on an intermodal, rather than on an intramodal basis.
- A study should be initiated to examine the value of mainline intermodal transfer facilities in the Dakotas, Iowa, and Minnesota.

### **1.2.2 Study Area Economics**

In the study area, farming and ranching, followed by tourism, and the oil and gas industry, generate a majority of the economic wealth. Wealth generated by farming is primarily based on exporting the farm products to domestic and international markets. A large portion of this farm production is shipped by truck using US 2 as the primary route to reach ports and market destinations.

In the study area, a number of important socioeconomic trends have been identified which alter the social and economic structure of the area. These trends include decrease in number of farms, low prices for traditional farm products, decrease in employment, decrease in number of people, average age of people increasing, closing of schools, and railroad abandonment. Because of these trends, many of the smaller towns are no longer able to support the basic services

such as grocery stores, pharmacies, medical facilities, auto service stations, agriculture equipment parts and service, and schools. Residents have to travel longer distances to obtain basic services and employment opportunities. Combined with the increasing average age of the residents, these longer and more frequent trips make it more important to provide a highway facility that is safer by incorporating design features that accommodate the needs of older drivers.

Agriculture: The agricultural industry has responded to changing socio-economic trends by increasing farm size, diversifying crops, and increasing the acreage of irrigated land. The industry is also broadening the economic impact of agriculture by investing in or supporting on-the-farm agriculture processing and developing value-added processing plants in the area.

In recent years, several value-added agricultural products processing plants have looked at the area and two processing plants have been built. A new pasta production plant, built in Crosby, began production in 2002. A new plant for processing alfalfa for export began operation in Tioga in 2002. These plants will result in an increase in area truck traffic bringing in the raw agricultural products and shipping processed products to markets.

Plans to build an ethanol plant in Williston were announced in July of 2003. The 17-million-gallon ethanol production facility will require about 6.8 million bushels of corn annually. The corn will be shipped to the processing plant by truck. The plant will also produce a by-product for feeding cattle that will need to be shipped out also by truck. It is estimated that about 13,000 truck trips annually will be required to ship in the corn and ship out the by-product.

In the past, railroads were used to ship the majority of the farm products out of the area for sale or processing. Today, specialty crop production is shipped primarily by trucks to local processing and packing plants or to large US markets outside the area. It is anticipated that the need for farm trucking to deliver goods will increase, as farm production increases due to increased use of irrigation and shifts

toward more diverse crops targeted for export to foreign markets. US 2 is the primary east-west route for transporting agricultural products from the study area.

Tourism: Tourism has been and will continue to be a major emphasis area for sustaining and promoting economic activity in North Dakota. According to a study conducted by North Dakota State University Agribusiness, tourism is the second largest industry in North Dakota (slightly behind agriculture). Tourism is the fastest growing industry in the state, with a growth rate over 500 percent since 1990.

Tourism is a major driving force for the study area's economy as well as the statewide economy. Northwestern North Dakota has a rich culture and heritage on a backdrop of scenic beauty with numerous things to see and do throughout the region. Some of the major tourist attractions in the area include:

- Fort Union National Historic Site
- Fort Buford
- Missouri Yellowstone Confluence Interpretive Center
- Numerous private resorts and public lands are located on shores of Lake Sakakawea with excellent fishing and hunting opportunities
- Premier paddle fishing at the confluence of the Missouri and Yellowstone Rivers
- Many national wildlife refuges and state-owned wildlife management areas used for bird watching and hunting
- One of the top new golf courses in the United States, The Links of North Dakota, is located about 20 miles south of Ray on Lake Sakakawea
- Annual Norst Hostfest celebration in Minot
- North Dakota State Fair in Minot

US 2 has a major traffic impact from tourism across the state and in the northwestern part of the state. Increased statewide tourism promotions, as well as those in the study area, have attracted more tourists to the area's new attractions. With the Lewis and Clark Trail crossing the study area, growth in tourism is expected to increase substantially in the northwest corner of the state. Traffic on US 2 will also increase from this fast-growing industry.

Oil Production: North Dakota is an oil-producing state, and US 2 passes through the heart of the Williston oil basin. The oil industry is one of the major employers in the area. Oil trucks and other industry support vehicles frequently use US 2. These vehicles are slower moving and due to the location of collection sites and drilling locations, they may need to make a turn almost anywhere along the route. Daily monitoring of collection sites requires frequent access where turning and passing lanes do not exist. This requires vehicles passing to use the opposing lane and places them in conflict with oncoming traffic.

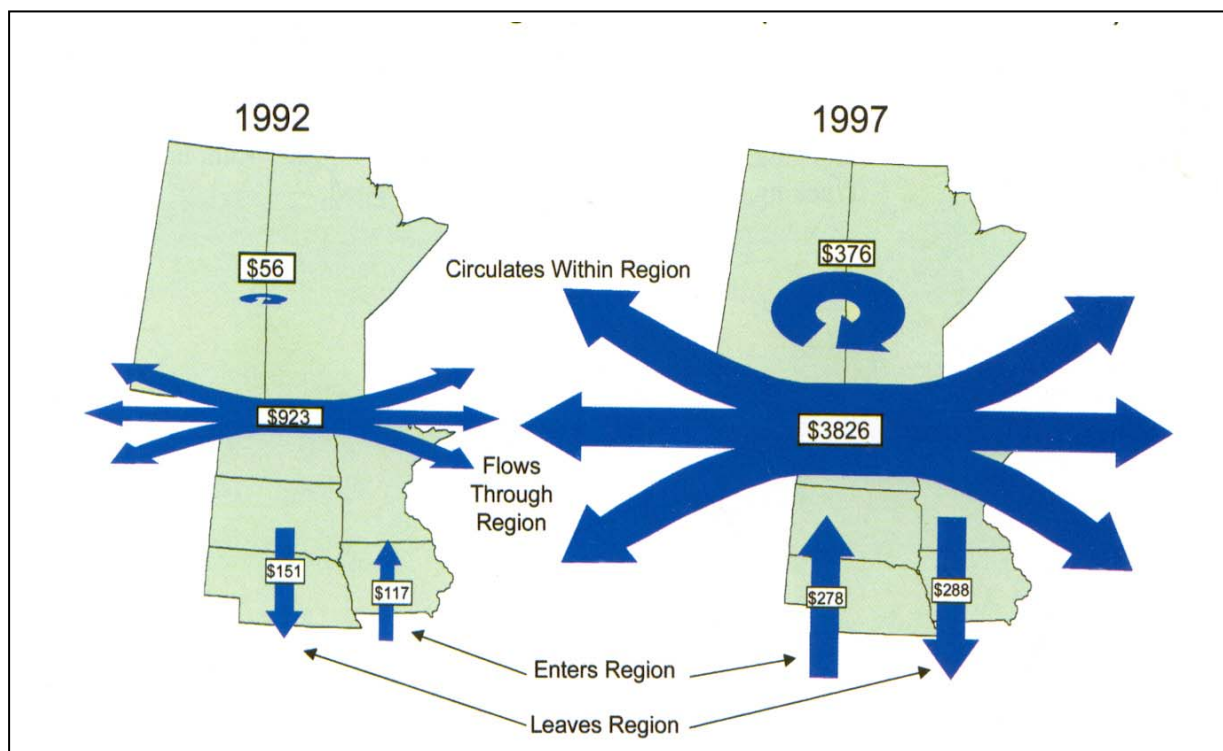
In the past, the major oil activity was located west of Minot; the search for new oil resources in the state is expanding to the east. This is evidenced by the increased interest oil companies are showing in obtaining oil leases on land east of Minot. Oil industry companies and processing facilities are primarily located in the west. Eastward expansion of the oil industry will generate additional east-west traffic on US 2.

### **1.3 Transportation System**

Roads and highways in the NGP region are the most crucial element of the transportation system providing residents access to work, education, basic services, health care, and recreational opportunities. The NGP's road and highway network also moves enormous volumes of freight as well as connecting manufacturers and producers with intermodal facilities. The NGP faces several challenges, including rail-line abandonment, the evolution of the grain storage and transportation network, limited access to air service, and lack of intermodal services.

Traditionally, the flow of goods and people followed railways and highways along east-west corridors. Because of its central position within the North American Continent, the NGP highway network must handle a large amount of through traffic. According to the Trade Patterns and Economy of the Northern Great Plains report of October 2001, total value of freight flow through the NGP increased from \$923 billion in 1992 to \$3,826 billion in 1997(See Figure 1-5). In addition, in 1997, total value of freight flow through the NGP was approximately four times greater than what was generated within the NGP. US 2 is an important east-west corridor across North America and it is anticipated that this growth in freight flow will continue to increase truck traffic on the study segment.

**Figure 1-5. Total Freight Flow Associated with the Northern Great Plains NGP, 1992 & 1997 (in billions of 1992 dollars)<sup>2</sup>.**



In 1999, the Northern Great Plains Initiative for Rural Development (NGPIRD) received funding from FHWA to conduct a study that would analyze the current opportunities for

<sup>2</sup> Northeast-Midwest Institute and Northern Great Plains Inc., October 2001. *Trade Patterns and the Economy of the Northern Great Plains*

NGP regional and international trade development and then correlate those opportunities with regional transportation needs. NGPIRD eventually became the Northern Great Plains, Incorporated (NGP Inc.).

NGP Inc.'s report, "Toward New Horizons"<sup>3</sup>, identified three significant trade trends that will shape the future of the NGP. One is the emergence of global trading structures (i.e., World Trade Organization); second is the multi-national trade associations (i.e., North American Free Trade Association); and third is the sub-national or regional trading blocs. The impact of these structures is that North Dakota must have a transportation system that allows producers the ability to participate efficiently and effectively in the international, multi-national, and regional marketplace. The NGP Inc.'s report clearly sees the need for states and provinces within the region to approach many transportation issues from a regional perspective. The following quote from "Toward New Horizons" best describes how the transportation and trading infrastructure needs to be structured to support the 21<sup>st</sup> century global trading system and needs.

"In the future, Transportation Departments will need to shift from modal silos and a highway focus to integrated intermodal planning and a multi-modal focus; from a design, build, and construct perspective to one of managing, operating, and monitoring performance; from a system design perspective that supports large, unscheduled movements and high inventory business practices to one that supports time-sensitive, scheduled, and expedited shipments and just-in-time business practices; and from a go-it-alone approach with clearly delineated boundaries and responsibilities to one of building partnerships between public agencies and between public and private entities with everyone having shared responsibilities for promoting economic growth."

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<sup>3</sup>Northern Great Plains Inc. and Northeast-Midwest Institute May 2002. *Toward New Horizons*

**Highways:**

US 2 is a major east-west corridor running through the northern part of the United States from Washington State to northern Minnesota (See Figure 1-1, page 1-2). US 2 is part of the National Highway System and connects the major cities of Williston, Minot, Devils Lake, and Grand Forks in northern North Dakota. US 2 is the primary east-west route in the northwestern part of the state and interconnects with several north-south state highways, including US 85 at the west end of the proposed project, ND 40 ten miles east of Ray, ND 8 at Stanley, ND 28 at Berthold, and US 52 near the east end of the project limits. US 2 serves rail facilities, located along the highway, is a major link to ports on the Great Lakes and West Coast, and provides access to air services. US 2 serves four regional airports in North Dakota. These airports are located in the cities of Williston, Minot, Devils Lake, and Grand Forks.

US 2 serves four colleges in North Dakota. They are University of North Dakota-Williston Branch at Williston, Minot State University at Minot, Lake Region Community College at Devils Lake, and the University of North Dakota at Grand Forks (See Figure 1-6).

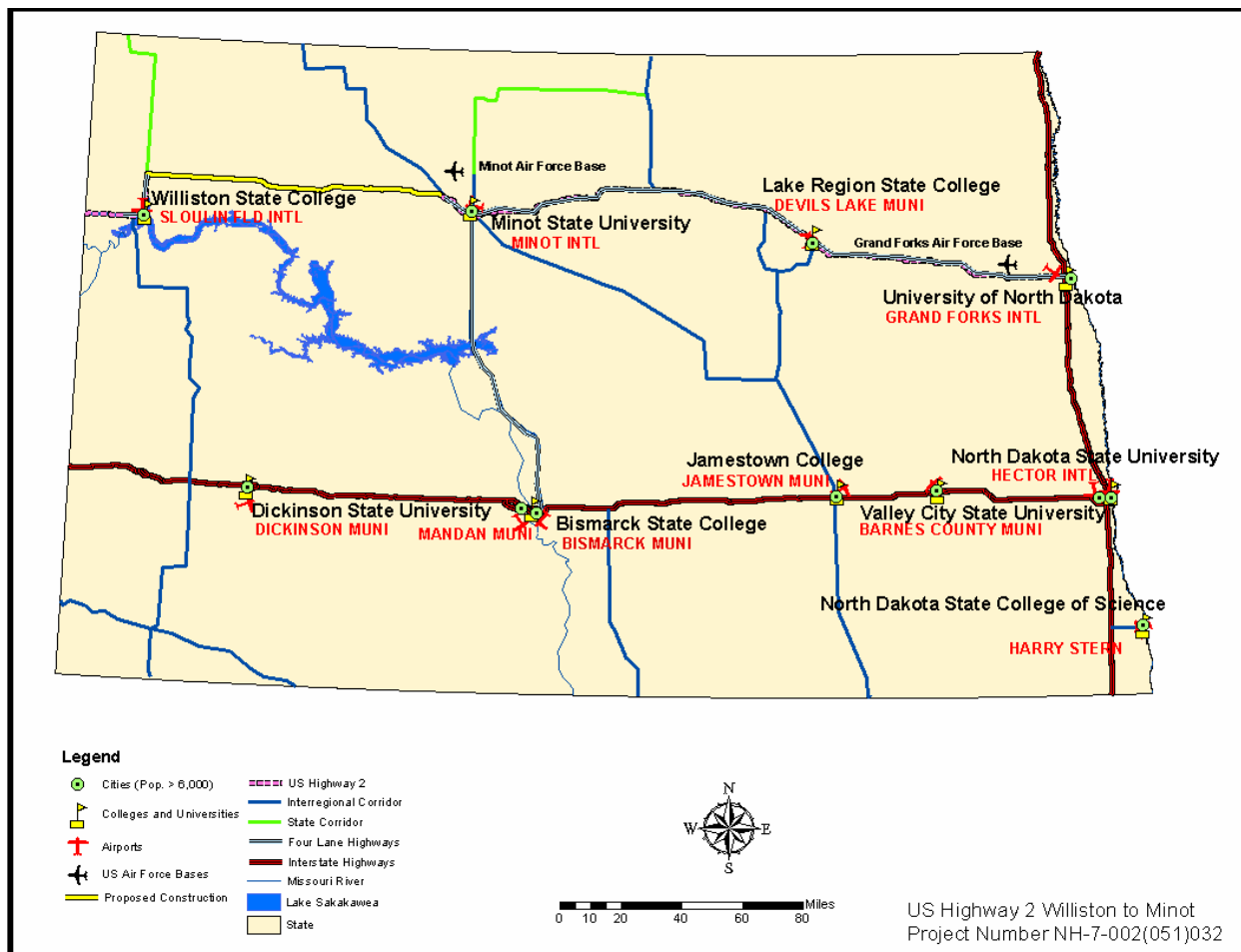
Major medical facilities are located in the cities of Minot and Grand Forks. Clinics and smaller medical facilities are located in Williston and Stanley. US 2 is often used to access these medical facilities.

The Minot Air Force Base (MAFB), located north of Minot on US Highway 83, and the Grand Forks Air Force Base, located west of Grand Forks, are dependant on US 2 to serve their highway transportation needs. The North Dakota National Guard Camp, Gilbert C. Grafton, is located four miles south of US 2 near Devils Lake, North Dakota. Almost every weekend, troops must travel from across the state to Camp Grafton for weekend training activities.

Military convoys travel US 2 while servicing MAFB missile sites throughout the study area. The study segment is designated as the primary route for many of the 35 missile facilities located in this area. For the area missile facilities that have other designated

primary routes, US 2 is designated as the secondary route or backup route whenever other primary routes have any hindrances. Convoys are directed to use the secondary routes when primary routes have problems. Convoys typically consist of ten slow-moving vehicles (55 mph or less) that span up to 1400 yards. Due to the sensitive nature of the convoy's cargo, passing vehicles are not allowed to break-in anywhere in the formation.

**Figure 1-6. Colleges, Airports, and US Air Bases**



On two-lane roads, the slow travel speed of the convoys often leads to the formation of vehicle platoons to the rear. Vehicles attempting to pass with insufficient passing lengths are forced to accelerate quickly to pass the convoy or slow down drastically to return to the position behind the convoy. When there is vehicle breakdown in the convoy, security measures call for stoppage of traffic in both directions until the problem can be resolved. Serious traffic delays can be expected when this occurs, or traffic will be forced to use a detour if one is available.



Due to the rural nature of northwestern North Dakota, there are not many alternative modes of transportation available that would satisfy the needs of the study area. Furthermore, limitations are placed on the transportation of people and commodities to the north by the international border and to the south by the man-made physical barrier of Lake Sakakawea. These limitations mean the movement of people and commodities, in and out of the study area, is primarily in the east-west direction. Other routes that parallel US 2 are not direct routes, and many of them have width restrictions, weight limits, or pass through small towns with reduced speed limits.

NDDOT's Highway Performance Classification System (HPCS) includes the entire stretch of US 2 across North Dakota in the Interregional System of roads. Long distance freight, commodities, and passenger movements are common on the Interregional System. Interregional designation means that this roadway needs to maintain a high degree of reliability, maintain average travel speeds of 60 to 65<sup>4</sup> miles per hour, and demonstrate a high degree of safety. Other characteristics included for Interregional System roads are:

- Interregional highways function as Principal Arterials.
- Interregional highways maintain a high degree of reliability and mobility, as these highways are critical since they support and promote international, national, regional, and state trade and economic activity.
- Interregional highways are free of height and width restrictions.
- Interregional highways have unrestricted seasonal load limits.
- Interregional highways have minimal limited passing restrictions.
- Accommodating truck traffic is a priority.
- Need to demonstrate a high degree of safety with crash rates below the statewide average.

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<sup>4</sup> ND State Law, effective August 1, 2003, sets speed limits on two-lane highways at 65 mph, multi-lane highways at 70 mph, and interstate highways at 75 mph.

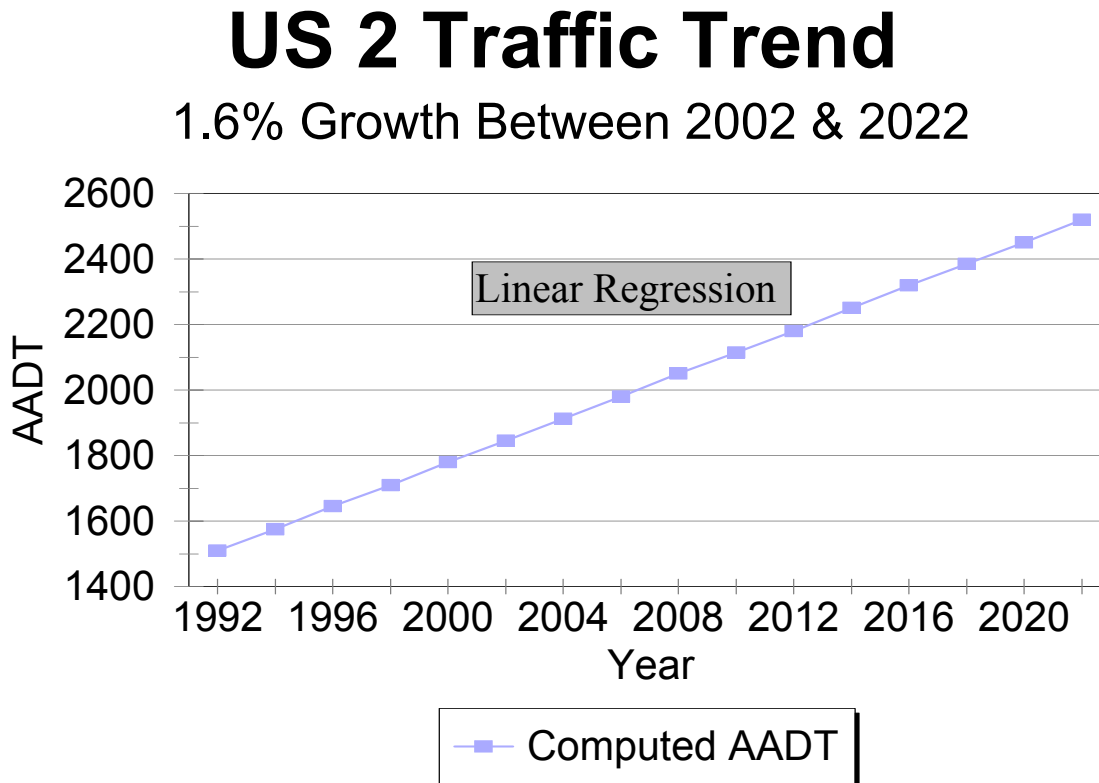
Railroads: Although railroads do service the study area, substantial changes in their operations have had negative impacts for local producers. The following changes by the railroad companies have resulted in less service and increased costs for producers who use railroad services to ship their products to market.

- Branch-line abandonment has left some grain elevators with no railroad service. These elevators rely on trucks to move their grain to market or have had to close their doors.
- Regionalization of railroad loading facilities to accommodate 110-car unitized trains has required producers to haul their products longer distances to reach these facilities (see Figure 1-12, page 1-30).
- Freight rate breaks for high throughput grain elevators capable of loading unit trains in one day have made it hard for many grain elevators to compete economically.
- Disparate shipping rates have given some railroad loading facilities a competitive advantage even though they may be longer distances away from markets. Producers are then required to haul longer distances by trucks to these facilities to participate in the higher prices they can offer.

These changes have resulted in an increased dependence by local producers on trucks that use US 2 for trucking commodities to the local elevators. Once the grain is loaded on trucks, it often becomes economical to haul the produce longer distances to larger, regional grain elevators or to the larger terminals in Duluth-Superior or the Pacific Coast. US 2 is the primary truck route serving the study area because it is a direct route to these markets.

Traffic Trends on US 2: The Annual Average Daily Traffic (AADT) has shown a steady increase over the past ten years. Figure 1-7 shows that in 1992, the AADT on US 2 was about 1,500 vehicles per day. In 2002, the AADT was about 1,900 vehicles and it is estimated to increase to 2,500 vehicles by the year 2022. Total AADT increased by nearly 26 percent from 1992 to 2002 and is expected to grow by another 32 percent from 2002 to 2022.

Figure 1-7. US 2 Traffic Trend

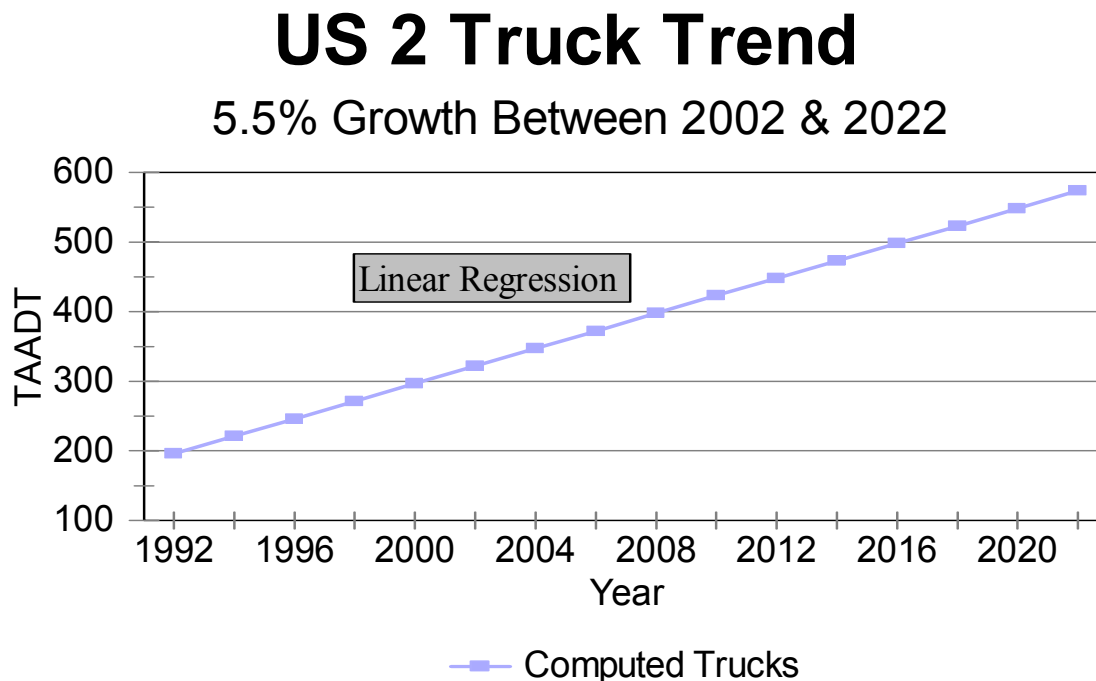


Future traffic projections were prepared using the linear regression method. Projections are based on existing conditions, and the estimates are conservative. Changes in the agricultural industry, additional traffic from Canada as the money exchange rate becomes more enticing, future economic development ventures, increases in tourism activity, or a resurgence of oil, gas, and mining activity would result in traffic increasing on US 2 beyond current projections.

Truck traffic has also shown a steady increase (see Figure 1-8). From 1992 to 2002, truck AADT increased about 65 percent from 200 trucks per day in 1992 to about 330 trucks per day in 2002. It is estimated that truck AADT will increase almost 75 percent to about 575 trucks per day by 2022. In 1992, trucks made up about 13 percent of the total traffic on US 2. Truck traffic increased to just over 17 percent in 2002 and is projected to be about 23 percent of traffic by 2022. One reason for the increase in truck traffic on US 2 was the passage of the North American Free Trade Agreement (NAFTA) in 1994, which resulted in more trucks passing through our border crossings. The

economic activity generated at the border has placed heavier trucks on routes that did not carry this traffic prior to the passage of NAFTA.

Figure 1-8. Hwy 2 Traffic (Truck)



As the percentage of truck traffic continues to increase, so do safety issues. The need for truck climbing lanes and adequate site distance for passing become more prevalent. Improving US 2 will promote the efficient and effective movement of people and goods and help alleviate potential conflicts between trucks and other vehicles traveling on the roadway.

## 1.4 Study Route Segment Description

US 2 was originally constructed, across North Dakota, in various stages from the 1920s into the 1950s. Driving speeds were lower and passing site distance was not much of a concern. Because of changes in automobiles, increase in travel speed, increase in truck size and weight, railroad abandonment, recreational changes, changes in the agricultural industry, the presence of military installations, and increase in volume of traffic, US 2 has seen many changes since the 1950s.

The segment of US 2 being considered for improvement (study segment) extends from the intersection with US 85 (MP 32), located 12 miles north of Williston, east approximately 100 miles to the intersection with US 52 (MP 131) (see Figure 1-3, page 1-4). The study segment crosses three counties in the study area: Williams, Mountrail, and Ward Counties. The 100-mile study route will be described in three sections. The first section is a 22-mile section on the west end, extending from US 85(MP 32) to Ray to (MP 53). This 22-mile section was originally graded in 1956, and in 1957, the roadway was paved with hot bituminous pavement (HBP). This section received chip seals in 1987 and 1996. The pavement on this west 22-mile section is 46 years old. The overall International Roughness Index (IRI) is poor. This section of surfacing has surpassed its design life and current conditions warrant a mill and a hot bituminous overlay.

The second section, from Ray (MP 53) to four miles west (MP 117) of Berthold, was graded and surfaced from 1977 to 1981. From 1995 to 1999, these sections received a HBP overlay. The IRI rating is good, and there are no plans for major improvements to this section. This section was included in the 1976 final EIS<sup>5</sup>, which evaluated the impacts for relocation of the existing road and the future addition of a second roadway as a four-lane facility (Section 1.5 Project History).

The third section is the east 12 miles from four miles west (MP 117) of Berthold to the US 52 intersection (MP131). This section was graded in 1955 and paved in 1956. In 1991, 0.8 inch was milled off the roadway surface, and 3.5 inches of HBP were placed on the roadway. The overall IRI rating is good. The roadway surface is 12 years old, and there are currently no major improvements scheduled.

The study route segment of US 2 provides two different transportation functions. It functions as a major east-west corridor through the northern United States and northern North Dakota as well as functioning as a local access road. Regional and local traffic travels on US 2 between Williston and Minot, a distance of 128 miles, including the 100 miles of the study segment. The study segment passes through four communities and

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<sup>5</sup> FHWA-ND-EIS-74-04F, see page 1-25 for more information.

provides access to another seven communities within five miles of the road. It also provides access to 35 Minot Air Force Base Minuteman Missile sites and control installations within a 30-mile corridor. Military convoys use US 2 for transporting the overweight, oversized, and high-security missiles.

There are approximately 2780 farms scattered throughout these three counties; many use US 2 in their daily operations. Because of today's larger farms, the size of the farm equipment has grown tremendously in the last 20 years. It is

common to see farm equipment that is greater than 30 feet wide or more than 100 feet long traveling on US 2 (See Figures 1-9 and 1-10<sup>6</sup>). This wide equipment will usually

**Figure 1-9. Oversized Farm Equipment**



**Figure 1-10. Meeting Oversized Farm Equipment**



extend across the centerline on a two-lane road. Many township and county roads have small bridges with width restrictions or maximum weight restrictions that prohibit use by large equipment. This large farm equipment is often forced to use US 2 to travel from one location to another in addition to accessing farms and fields located all along the road. Average speed of most farm

equipment on the road is less than 25 miles per hour. This slow-moving, obstructive equipment presents safety problems when motorists, traveling at the speed limit, encounter them on the road.

<sup>6</sup> These pictures are examples of just two of the many types of large, slow-moving farm equipment that use US 2. Although the equipment in these photos is shown off to the right side of the road, often that is not possible due to presence of signs, roadside delineators, drainage structures, and guardrail.

Additionally, there are many oil wells and pipeline tank terminals in the area that require daily maintenance inspections or transportation of oil by truck to pumping terminals. This highway is used by Star Route and rural delivery mail carriers as they deliver mail to rural farm families. It is also used by school buses that transport children from farms and small towns to the schools, located in the larger communities.

The two different transportation functions performed by the study segment, major corridor and local access, do not complement each other and result in a decrease in safety and service quality. The local usage results in frequent and dangerous impediments to traffic due to high numbers of turning movements, large slow-moving farm implements, frequent school bus turning or stopping, and large slow-moving military convoys. The presence of no-passing zones due to limited site distance, lack of left- or right-turning lanes, and inability to pass due to oncoming traffic in the opposing lane contributes to increased travel time and additional safety concerns.

AASHTO's "Policy on Geometric Design of Highways and Streets" references Transportation and Research Board's (TRB) Highway Capacity Manual (HCM) as the guide to defining the quality of traffic service provided by a highway facility. The HCM lists these three parameters to define service quality of two-lane highways: 1. Average travel speed. 2. Percent time delay. 3. Capacity utilization. Of these three, the percent time delay is the primary measure of service quality. Percent time delay is the average percent of the total travel time that a motorist is delayed in platoons. Motorists are defined to be delayed when traveling behind a platoon leader at speeds less than their desired speed for a period of five seconds or more. Motorists, traveling the study segment of US 2, are delayed whenever they encounter vehicles turning into one of the many local access points, one of the many trucks using the roadway, the slower moving military convoys, or the large slow-moving farm equipment using US and the opposing lane is occupied. Service quality will further decrease as passing delays and reduced travel speed problems increase as the percentage of truck traffic increases (see Section 1.3, Traffic Trends on US 2).

## **1.5 Project History**

By the mid to late 1960s, efforts began to improve the US 2 corridor across the state, a distance of 358 miles. These efforts continued through the 1970s and 1980s, and are ongoing today. An organization of city officials and private citizens from the communities along US 2 called, “Communities for a Modern U.S. Highway 2,” was organized in the 1960s. This group has expressed the need for a more reliable, safe roadway that will support the area's economic development initiatives.

Senate Concurrent Resolution No. 4036 that was passed by the North Dakota Forty-Fourth Legislative Assembly in 1975 evidences a further indication of the importance of this highway. This resolution states, “The Forty-Fourth Legislative Assembly urges the Highway Commissioner to concentrate efforts toward needed improvements on U.S. Highway 2 across the entire state to bring it up to expressway standards within ten years.”

The 1977 North Dakota Legislative Assembly passed a one-cent increase in the state gasoline tax to assure the state would have adequate finances for needed highway improvements. This tax increase passed with the support of the “Communities for a Modern U.S. Highway 2” committee as well as other groups interested in improving US 2.

During the 1970s and 1980s, over a dozen Environmental Impact Statements (EIS) on the US 2 corridor were written and approved. These EISs covered many improvements such as railroad grade separations, major intersection separations, relocations to bypass restrictive urban settings, elimination or reduction of no-passing zones, wider shoulders, and adding lanes. Below is a partial list of the many improvements addressed in the approved EISs that have been completed on the US 2 corridor:

- 1978 - Stanley to four miles west of Berthold; relocation, four-lane plus center turn lane bypass at Stanley, and ROW acquisition.
- 1979 - The 14-mile segment from Williston north to US 85 reconstructed and upgraded to a four-lane roadway.
- 1979 - Railroad separation constructed west of Berthold.



- 1980 - The 14-mile segment from Minot west to the intersection with US 52 reconstructed and upgraded to four-lane roadway and railroad separation.
- 1981 - Completed a four-lane bypass around Minot, including major intersection separations.
- 1986 - Four miles west of Williston reconstructed and upgraded to a four-lane roadway.
- By 1987, the entire stretch of US 2 from Minot east to Grand Forks, a distance of 211 miles, was reconstructed and upgraded to a four-lane roadway.

The 1976 Final Environmental Impact Statement (FEIS), FHWA-ND-EIS-74-04F, addressed the social, economic, and environmental impacts of relocation and reconstruction from Ray to four miles east of Berthold (a distance of 66 miles within this project area). Following the FEIS, NDDOT relocated or reconstructed these 66 miles of two-lane highway in order to address the immediate problems. The same FEIS disclosed the impacts of a four-lane highway for the purpose of ROW acquisition along this 66-mile segment. All wetlands covered by US Fish and Wildlife Service (USFWS) easements that were within the newly purchased ROW, were mitigated at that time. Mitigation was accomplished when NDDOT purchased a site in the area where wetlands easement rights were established and transferred to the USFWS.

By the late 1980s, 246 of the 358 miles of US 2 across North Dakota had been reconstructed and were four-laned. During this time, North Dakota was suffering from tough economic times that were especially hard on the oil industry as well as the farm economy. In addition to the tough economy, statewide flooding impacts to the State's roadways in the early 1990s resulted in NDDOT having to reprioritize spending programs. Lack of available funds and the need to raise roads on an emergency basis resulted in placing planned improvements to US 2 on hold.

By the mid 1990s, US 2 reconstruction once again became a priority when planning started on replacement of a narrow two-lane railroad underpass at Ray. In 1997, the old underpass was replaced with a five-lane railroad overpass.

In 1995, the National Highway System (NHS) Designation Act was enacted to identify a network of nationally significant highways that were approved by Congress. The NHS is important to the nation's economy, defense, and mobility. According to former FHWA administrator Rodney Slater, the NHS was a key component to the former President Clinton's initiative to rebuild America. The NHS helps sustain and promote our economic growth and enhance our nation's competitiveness in the global marketplace.

According to Administrator Slater, since the beginning of Interstate highway construction in 1956, the population has grown and shifted, our economy has changed, and transportation needs have evolved. To meet these demands and to extend the benefits of the Interstate System to areas that are not directly served by it, the concept of the NHS was developed as a way of focusing federal resources on the nation's most important roads. The advantage of the NHS is that it encourages states to focus resources on a limited number of high-priority routes and to concentrate on improving them with federal aid funds.

NDDOT recognized the importance of US 2 as the primary east-west route in the northern part of the state and designated the route as part of the NHS. The Transportation Efficiency Act of 1998 (TEA-21) provided North Dakota with \$13.1 million to be used on High-Priority Projects. NDDOT has the discretion of identifying the state's high priority projects for utilizing these funds. US 2 has been identified as a high-priority project and a portion of these funds will be used to upgrade this route. In 1999, NDDOT embarked on a new study to reassess the environmental impacts associated with reconstruction of this 100-mile segment of US 2.

The current Governor of North Dakota has established a goal of promoting economic vitality, sustaining economic growth, and enhancing the quality of life for the people of North Dakota by implementing a policy of providing a four-lane highway to serve all cities with a population that is greater than one percent of the state's overall population.

North Dakota's Statewide Strategic Transportation Plan (TransAction) identifies "North Dakota's transportation system as an important part of regional, national, and global

systems, developed strategically to help grow and diversify the economy and enhance our quality of life.” TransAction is North Dakota’s federally required Statewide Transportation Plan. Two initiatives outlined in TransAction relate directly to improving US 2. The initiatives are: North Dakota will improve the performance of priority transportation corridors and facilities; North Dakota will incorporate economic competitiveness as an integral component of transportation investment strategies.

Improving the US 2 Corridor supports the mission and vision of NDDOT, which are outlined in the NDDOT Strategic Plan. There are also three goals in the plan to support improving US 2 corridor. These goals include: (1) Enhance customer satisfaction, (2) Increase safety on North Dakota’s transportation system, and (3) Improve the quality and efficiency of North Dakota’s transportation system and services. Improvements to US 2 are consistent with the Statewide Transportation plan, and the project is listed in the approved Statewide Transportation Improvement Program (STIP).

## **1.6 Economic Viability**

“In order to meet the challenges of the a 21<sup>st</sup> century global economy, the NGP Region will need to actively work to ensure that its transportation and information technologies infrastructure is capable of serving the international trade and transportation needs of the Region”<sup>7</sup>. “Regional planners recognize that transportation infrastructure not only plays a significant role in supporting the logistical needs of the existing economy, but also can help to attract new companies to a given area. Corporate executives and site selection consultants frequently list transportation--especially access to major highways and international airports--as key factors in business location decisions”<sup>8</sup>. For their products to be competitive, study area businesses must be able to access a well-maintained and reliable transportation system at a reasonable cost. The challenge for the transportation system is to anticipate the changes in the non-transportation sector and keep pace with the needs.

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<sup>7</sup>Northern Great Plains Inc. and Northeast-Midwest Institute May 2002. *Toward New Horizons*

<sup>8</sup> Northeast-Midwest Institute and Northern Great Plains Inc., October 2001. *Trade Patterns and the Economy of the Northern Great Plains*

Some of the many changes taking place or anticipated to take place in the future are: The rapid expansion of irrigation in the study area. In 1997, there were 18,880 acres under irrigation, and in 2002 there were 21,000 acres (11.2 percent increase). Currently, there are seven new irrigation districts in various stages of planning. Total proposed acreage in the seven new irrigation districts is 43,000 acres, which will be more than a 200-percent increase in irrigated land over current acreage. Furthermore, planners have identified approximately 616,200 acres of land within 150 miles from Williston that have potential for irrigation or are already irrigated (See Figure 1-11). As the irrigated acreage increases, the production of high-value specialty crops will continue to increase.

Increased output of high-value specialty crops may result in the study area attracting additional processing plants to handle and market these products. Transporting the farm produce to the plants (See Figure 1-12) and moving the products to the markets over an efficient highway system will be vital to keeping the study area competitive in the market.

The city of Minot is undertaking several projects that will impact the transportation system in the area. The city has a task force diligently working on a proposed intermodal freight facility for the Minot area. The Minot Vocational Workshop was recently awarded a long-term contract with the U.S. Department of Agriculture for the processing and packaging of specific agricultural products for shipment abroad. This is a multimillion-dollar contract, which will result in increased truck traffic. Construction is underway for a large indoor water park and hotel on the south side of Minot, which will be a regional attraction. Burlington Northern Santa Fe Railroad has designated its Minot yard as the service stop between Chicago and the West Coast, and they are planning a major upgrade to the train yard in the near future.

As the oil and gas industry expands to the east in the state, a reliable, economical transportation system will be necessary to keep the current oil business and processing facilities, in the west, competitive.



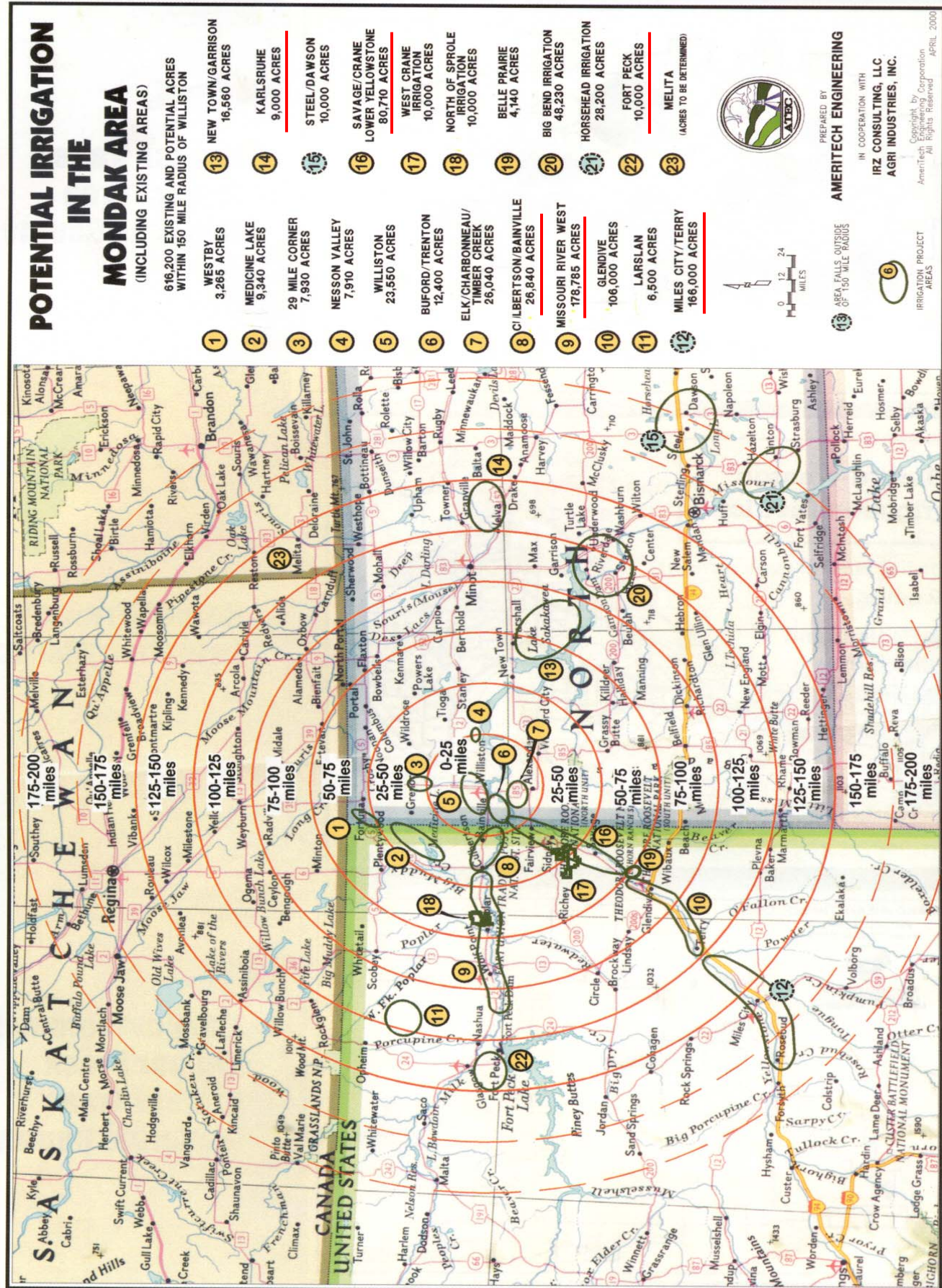
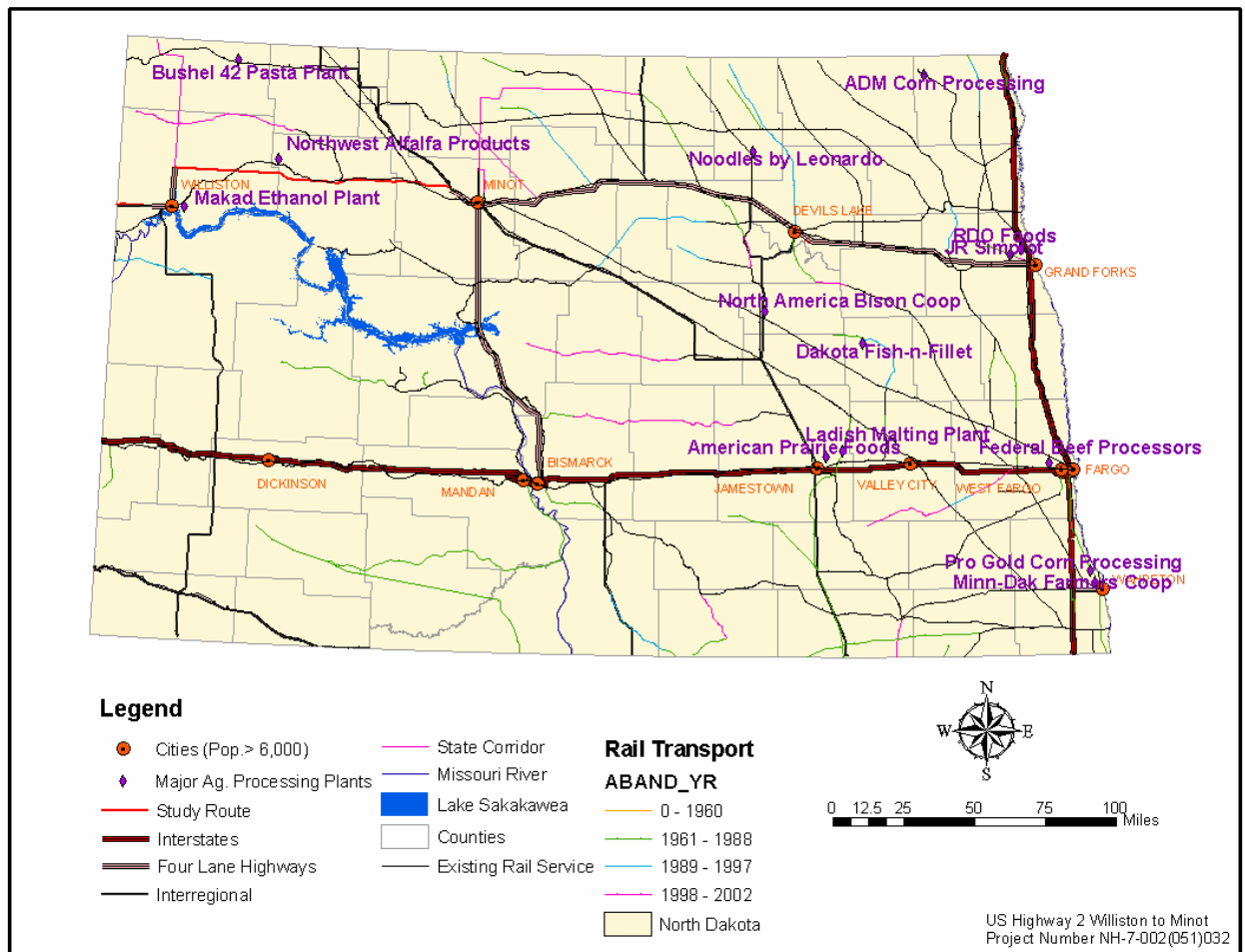


Figure 1-11.

Existing Irrigation Projects

Figure 1-12. Processing Plants



## 1.7 Purpose and Need

The purpose and need of the proposed US 2 project is to improve safety, to enhance system performance, and to improve system continuity between major cities.

### 1.7.1 Safety

The proposed project is needed to develop a transportation facility that provides increased safety features and safe access for communities, businesses, farms, oil field facilities, and military installations within the study area. The specific needs are:

- Provide a highway that will minimize geometric constraints (i.e., sharp curves, No-Passing Zones, and lack of turn lanes).
- Provide a highway that will minimize conflicts between through traffic



(i.e., grain trucks, oil trucks, interstate trucks, and motorists) and local traffic, military convoys, and large, over-width, slow-moving farm implements.

- Provide a highway that will minimize potential for crashes, specifically those types of crash that frequently lead to injury or fatalities such as head-on or rear-end type crashes.
- Provide a highway that is compatible with the needs of an aging population.

### **1.7.2 Enhance System Performance and Improve System Continuity**

The proposed project is needed to develop transportation improvements that enhance system performance for US 2 by providing a reliable, consistent, and predictable facility for the business consumer as well as the movement of people and goods to and through the northwestern part of the state. The specific needs are:

- Provide support for the increasing transportation needs resulting from the changes in the economy and ongoing economic development initiatives. The consolidation of grain elevators, and changes in crop output due to diversification and increased irrigation, have resulted in increased reliance on trucks to transport agricultural products to market. At the same time, many residents must travel longer distances just to obtain basic services or to find work. In response, communities in the study area have developed economic development initiatives. One component of support for these initiatives is a safe and reliable transportation system.
- Provide improvements to US 2 so that it may properly function as part of the Interregional System of roads under NDDOT's Highway Performance Classification System. This requires ensuring a high degree of reliability in the roadway, with minimal limited passing restrictions, a high degree of safety, and the ability to accommodate

truck traffic, and maintain travel speed average of 60 to 65 miles per hour.

- Pursuant to North Dakota's Strategic Transportation Plan (TransAction), which emphasizes improvement of priority transportation corridors, enhance the system performance of US 2 in the project area. The proposed improvements are also consistent with the Statewide Transportation Improvement Program.